

THE RHAPHIDOPHORIDAE (ORTHOPTERA) OF AUSTRALIA.

PART 2. A NEW GENUS.

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(Two Text-figures.)

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Synopsis.

A new genus, *Australotettix*, n.g., is erected, and two new species, *Australotettix montanus*, n. sp., and *A. carraiensis*, n. sp., are described. Both species occur in New South Wales.

INTRODUCTION.

A new genus, *Australotettix*, n.g., belonging to the family Rhabdiphoridae, is recorded here from New South Wales. This is the first record of the family in the State. *Australotettix montanus*, n. sp., has been collected from several areas in the Blue Mountains, while *A. carraiensis*, n. sp., occurs in caves west of Kempsey. Both species share their habitats with large populations of glow-worms, *Arachnocampa* sp.

Rhabdiphorids occur in caves, tunnels, and in the bush, but usually a species occupies either a cave and tunnel, or a bush habitat, and is not found in both ecological niches. *A. carraiensis* is recorded from limestone caves only, but *A. montanus* has adapted itself to a wide range of habitats. It was first recorded from the bush in the Grose Valley near Katoomba, in the Blue Mountains. It was then observed in an old mining tunnel at Mt. Victoria; and was more recently collected from the walls of an overhanging sandstone shelter at Horseshoe Falls, Hazelbrook. The tunnel simulated conditions similar to those of a cave, and pools of water gave a high relative humidity. The rock shelter in contrast had a moderate light intensity in the daytime, a wide range in temperature fluctuation, and a much lower relative humidity than in the tunnel. As the cave crickets were observed on the walls of the rock shelter only at night, it is assumed that they spent the daylight hours in the surrounding bush in conditions of lower light intensity.

A. carraiensis occurs in limestone caves about 28 miles due west of Kempsey, or 48 miles by road. The caves are situated in two separate areas within a few miles of each other. These areas are known in the district as Carrai or Haydonville, and Windy Gap. All the caves are surrounded by dense rain forest. The Kempsey Speleological Society have numbered the Carrai caves as WW₁, WW₂, S₅ and S₆, and the Windy Gap caves as S₁, S₂, S₃ and S₄. The S stands for Stockyard Creek, and the WW for Willi-Willi Creek, the two main water-sheds on which the caves are located. Some of the caves have also been given names. The Carrai caves are about 2,300 ft. above sea-level, and half-way up the Carrai plateau; while the Windy Gap caves occur in a valley about 1,500 ft. above sea-level. *A. carraiensis* has been collected from S₅, S₆, S₁ and S₂ but, according to Mr. C. Carter, also occurs in WW₁, S₃ and S₄.

Australotettix is the largest genus of Rhabdiphoridae so far recorded from Australia, an adult male of *A. montanus* reaching a length of up to 30 cm. from the tip of its antennae to its hind tarsi. *A. carraiensis* is somewhat smaller, the length of an adult male being about 23 cm. Sexual dimorphism is strongly developed in both species.

Genus AUSTRALOTETTIX, n.g.

Body clothed with numerous short setae. Legs long and slender. Antennae very long and tapering, almost touching at their bases; scape about four times as large as pedicel, which is narrower than scape, but broader than other segments; from fourth segment onwards segments subequal in length, although steadily decreasing in size; all segments thickly clothed with short setae. A single anterior median ocellus only. Fastigium rising very abruptly, convex, grooved medianly and longitudinally. Metasternum bearing a median tubercle. Fore coxae each armed with a retrolateral spine. All coxae armed with a prolateral apical spine, spines very prominent on fore coxae, but decreasing in size on middle and hind coxae. All femora sulcate ventrally. Apical spines on femora, tibiae, first and second proximal segments of hind tarsi constant in number. Fore femur bears two apical spines beneath, one prolateral and one retrolateral; fore tibia bears four apical spines, one above and one beneath, both prolaterally and retrolaterally; fore tarsus unarmed. Middle femur bears two apical spines beneath, one prolateral and the other retrolateral; middle tibia bears four apical spines, one above and one beneath, both prolaterally and retrolaterally; middle tarsus unarmed. Hind femur bears two apical spines beneath, one prolateral and the other retrolateral; hind tibia bears a pair of long apical spurs above, a pair of subapical spines above, and a pair of short apical spurs beneath, one from each pair being prolateral and the other retrolateral; two proximal segments of hind tarsus each bear two apical spines above, one prolateral and one retrolateral; the other two segments unarmed. Subgenital plate of female trilobed. Subgenital plate of male triangular, keeled; latero-medianly the plate bears two very slender styli, one to each side.

Type species for the genus: *Australotettix montanus*, n. sp.

AUSTRALOTETTIX MONTANUS, n. sp. Text-fig. A, 1-5.

Colour. Basic colour mid-brown, with pronotum, mesonotum, metanotum and abdominal terga irregularly mottled with light brown and ochreous; femora and tibiae of all legs light brown with transverse ochreous bands; tarsi ochreous; antennae light brown; ovipositor deep reddish-brown.

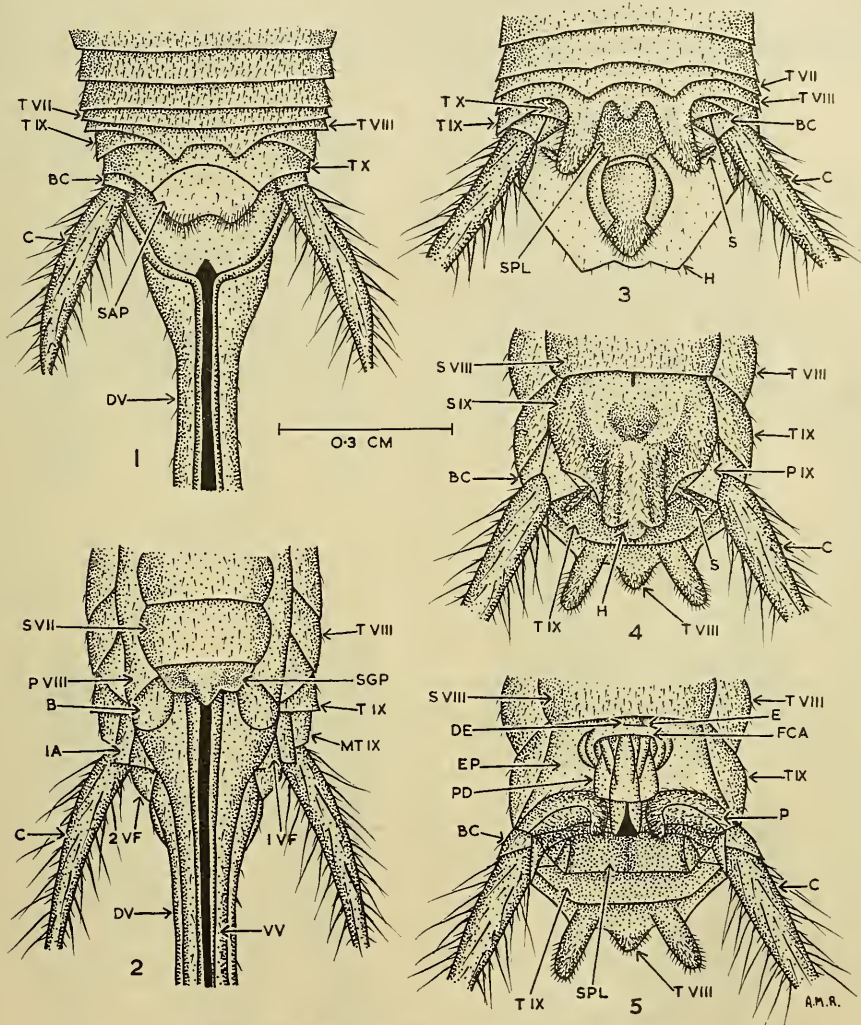
Body. Length up to 15 mm. Body sparsely clothed with setae. Ovipositor subequal with length of body; ventral valves armed distally with eleven teeth, gradually decreasing in size towards the apex, five more proximal teeth forming a scalloped margin, six distal teeth forming a strongly serrated margin. Antennae broken. Fastigium as high as long, with base touching scapes of antennae. Maxillary palps with third and fourth segments subequal in length. Sexual dimorphism shown by distal margin of tergite VIII of female being produced into two small lobes (Fig. A, 1). In male, distal margin of tergite VI slightly emarginate medianly with beginnings of two lobes; in tergite VII margin more deeply emarginate and lobes more definite in shape; in tergite VIII distal margin produced into two long lobes, distal portions of which are thickly clothed with short setae, between lobes lies a small median lobe also clothed with setae (Fig. A, 3).

Antennae. As in generic description. Third segment on dorsal aspect twice as long as pedicel in female, and 1.4 as long in male; on ventral aspect 1.25 as long as pedicel in female, and subequal in male. Sexual dimorphism present, male possessing slightly longer, stouter antennae than female. No spines present on flagellum of male or female.

Legs. Fore and middle legs subequal in length, with middle leg slightly shorter; hind leg 1.75 length of fore and middle legs. Sexual dimorphism shown by fore, middle and hind legs of female being 0.7 as long as male. Femora, tibiae and proximal two segments of hind tarsi armed with variable numbers of linear spines. No spines occur on fore or middle tarsi. No spines on middle femur of female, and spines on hind femur of female much fewer in number than those of male (Table 1). Apical spines constant in number, as in generic description. Length of proximal segment of hind tarsus subequal with other three segments together. Ratio of length of legs to length of body: Fore leg, male 3.6:1; female 2.7:1. Middle leg, male 3.4:1; female 2.4:1. Hind leg, male 6.1:1; female 4.4:1.

Genitalia.

Female: Suranal plate, Fig. A, 1 (SAP), convex laterally, distal margin emarginate; disto-laterally margin clothed with two groups of setae, rest of plate sparsely clothed with setae. Subgenital plate, Fig. A, 2 (SGP), trilobed, median lobe being longer than other two; all lobes acute at apex, median lobe slightly keeled; whole plate glabrous.



Text-figure A. *Australotettix montanus*, n. sp.

1, Female genitalia, dorsal view. 2, Female genitalia, ventral view. 3, Male genitalia, dorsal view. 4, Male genitalia, ventral view. 5, Male genitalia, ventral view, subgenital plate removed to expose structures beneath.

Male: Suranal plate, Fig. A, 3, 4, 5 (SPL), almost completely concealed by tergite VIII and subgenital plate; distal margin of plate truncate and clothed with short setae, rest of plate sparsely clothed with setae. Subgenital plate, Fig. A, 3, 4 (H), triangulate, convex proximally changing to concave distally, medianly plate is strongly keeled, distal margin trilobed, all lobes rounded at apex, median lobe longer than other two; distal half of dorsal surface thickly clothed with short setae, rest of plate sparsely clothed with setae; ventral surface sparsely clothed with setae; medianly it bears a large lobe thickly clothed with setae over more distal portion. Two styli, Fig. A, 3, 4

(S), very slender, thickly clothed with short setae, length of styli being 0.2 length of sternite IX (S IX). Parameres, Fig. A, 5 (P), elongate, rounded at apex, 2.7 longer than wide, prolateral margins thickly clothed with setae. Pseudosternite, Fig. A, 5 (PD), 1.5 longer than wide, with median spatulate-shaped lobe curving ventrally and two shorter lateral lobes. Penis not visible. Paraprocts absent.

TABLE 1.

Variability in Number of Linear Spines on the Legs of 25 Specimens of Australotettix montanus n. sp.

		Arith. Mean.		No. of Specimens.		Std. Dev.		Range (or Distribution).	
		L	R	L	R	L	R	L	R
Fore femur inf.	Pro.	0	0	25	25	0	0	0	0
	Retro.	0	0	25	25	0	0	0	0
Fore tibia inf.	Pro.	3	3	25	25	—	0	3 (24), 2 (1)	3
	Retro.	3	3	25	25	0	0	3	3
Fore tarsus	Pro.	0	0	25	25	0	0	0	0
	Retro.	0	0	25	25	0	0	0	0
Mid femur inf. ♂	Pro.	21.9	22.8	13	13	5.6	4.5	15-32	17-32
	Retro.	21.7	22.3	13	13	4.3	3.3	12-28	15-27
Mid femur inf. ♀	Pro.	0	0	12	10	0	0	0	0
	Retro.	0	0	12	10	0	0	0	0
Mid tibia sup.	Pro.	0	0	25	23	0	0	0	0
	Retro.	0	0	25	23	0	0	0	0
Mid tibia inf.	Pro.	3	3	25	23	0	0	3	3
	Retro.	3	3	25	23	0	—	3	3 (24), 4 (1)
Mid tarsus	Pro.	0	0	25	23	0	0	0	0
	Retro.	0	0	25	23	0	0	0	0
Hind femur inf. ♂	Pro.	52.8	52.4	13	12	10.9	11	37-72	34-75
	Retro.	76.7	78.7	13	12	11.4	9.7	60-94	65-100
Hind femur inf. ♀	Pro.	7.1	6.8	12	12	0.9	1.2	5-8	5-9
	Retro.	8	7.5	12	12	10.4	9.7	1-26	1-27
Hind tibia sup.	Pro.	31	31.4	25	23	4.4	4.3	23-43	24-41
	Retro.	37.1	38	25	23	4.5	4.3	29-46	31-45
Hind tarsus 1 sup.	Pro.	1.8	2	25	23	1.0	1.0	0-4	0-4
	Retro.	2.5	2.2	25	23	1.2	0.8	1-6	1-4
Hind tarsus 2 sup.	Pro.	1.2	1.4	25	23	0.4	0.6	1 (21), 2 (4)	0-2
	Retro.	1.2	1	25	23	0.3	0.4	1-3	0-2

(Figures in parentheses represent number of specimens.)

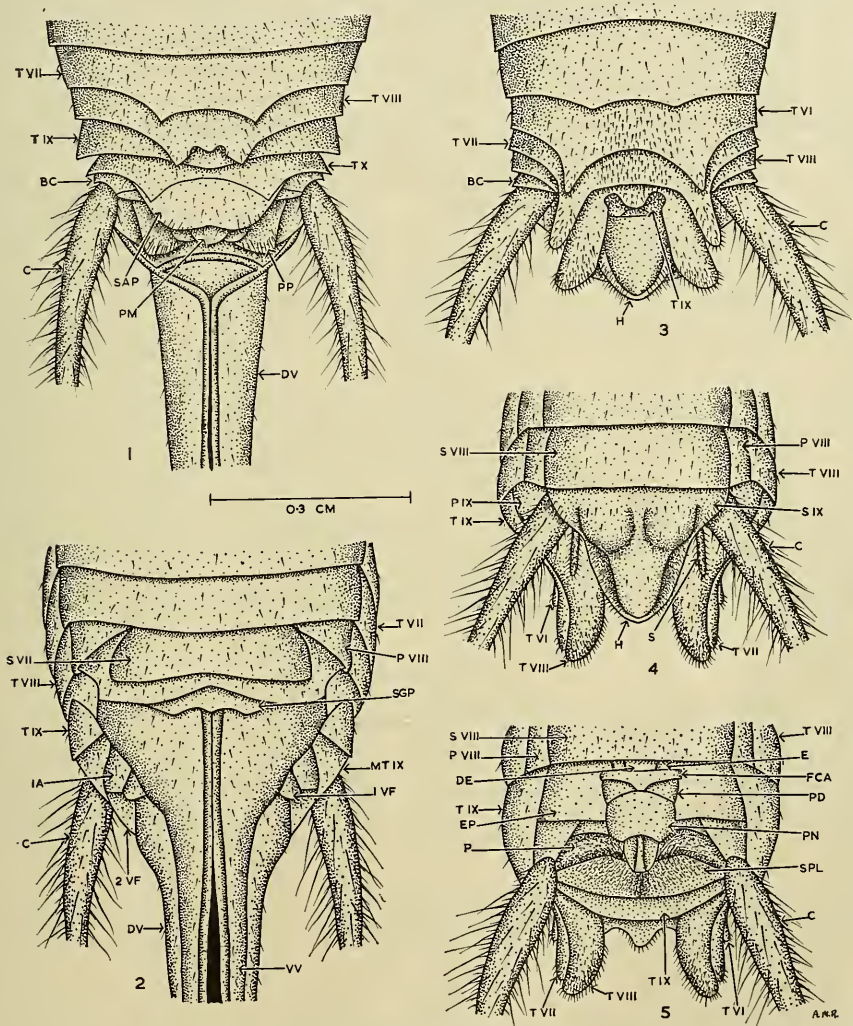
Locality. Old mining tunnel Mt. Victoria, New South Wales (type locality), coll. A. Healy 1961; Horseshoe Falls, Hazelbrook, New South Wales, coll. A. M. Richards 1963; Grose Valley, Katoomba area, New South Wales, coll. M. Montague 1958; sandstone cave, Springwood, New South Wales, coll. F. Evans 1961.

Types. Holotype male, Allotype female and Paratype male and female in Australian National Insect Collection, C.S.I.R.O., Canberra. Four Paratypes, two males and two females, in the Australian Museum Collection, Sydney.

AUSTRALOTETTIX CARRAIENSIS, n. sp. Text-fig. B, 1-5.

Colour. Basic colour mid-brown with all tergites irregularly mottled with light brown and ochreous. Femora and tibiae banded with light brown and ochreous; tarsi ochreous; antennae light brown; ovipositor reddish-brown.

Body. Length 17 mm. in female, and up to 20 mm. in male. Ovipositor subequal with length of body; ventral valves armed distally with eleven teeth forming a scalloped margin, the teeth gradually decreasing in size towards the apex. Antennae broken. Fastigium longer than high. Maxillary palps with third and fourth segments subequal in length. Sexual dimorphism present in female, median portion of distal margin of tergite VI slightly emarginate, tergite VII more deeply emarginate and produced on either side into two lobes, tergite VIII with more pronounced lobes and margin slightly convex between lobes. Variation in degree of development of lobes occurs from specimen to



Text-figure B. *Australotettix carraiensis*, n. sp.

1, Female genitalia, dorsal view. 2, Female genitalia, ventral view. 3, Male genitalia, dorsal view. 4, Male genitalia, ventral view. 5, Male genitalia, ventral view, subgenital plate removed to expose structures beneath.

specimen (Fig. B, 1). In male distal margin of tergite VI concave and produced into two lobes on either side, tergite VII with margin straight and lobes twice as long as in tergite VI; tergite VIII with two lobes longer and wider, and between them a small median lobe (Fig. B, 3). All lobes and distal margins clothed with short setae.

Antennae. As in generic description. Third segment on dorsal aspect 1.2 as long as pedicel in both male and female; on ventral aspect 1.2 as long as pedicel in male, and 1.4 as long in female. Sexual dimorphism present, male possessing slightly longer, stouter antennae than female. No spines present on flagellum of male or female.

Legs. Fore and middle legs subequal in length, with middle leg slightly shorter; hind leg 1.8 length of fore or middle legs. Sexual dimorphism present; fore, middle and hind legs of female being 0.8 as long as male. Femora, tibiae and proximal two segments of hind tarsi armed with variable numbers of linear spines. No spines occur on fore tarsi, middle tarsi, and fore femora of male or female, or middle femora of female. Spines on hind femora of female much fewer in number than those on hind femora of

TABLE 2.

Variability in Number of Linear Spines on the Legs of 29 Specimens of Australotettix carraiensis, n. sp.

		Arith. Mean.		No. of Specimens.		Std. Dev.		Range (or Distribution).	
		L	R	L	R	L	R	L	R
Fore femur inf.	Pro.	0	0	29	29	0	0	0	0
	Retro.	0	0	29	29	0	0	0	0
Fore tibia inf.	Pro.	3	3	29	29	—	—	2 (27), 1 (1), 2 (1)	3 (28), 2 (1)
	Retro.	3	3	29	29	—	0	3 (28), 4 (1)	3
Fore tarsus	Pro.	0	0	29	29	0	0	0	0
	Retro.	0	0	29	29	0	0	0	0
Mid femur inf. ♂	Pro.	28.4	26.4	10	10	5.1	4.5	19-35	17-32
	Retro.	22.5	23.8	10	10	4.4	4.9	16-30	17-34
Mid femur inf. ♀	Pro.	0	0	19	19	0	0	0	0
	Retro.	0	0	19	19	0	0	0	0
Mid tibia sup.	Pro.	0	0	29	29	0	0	0	0
	Retro.	0	0	29	29	0	0	0	0
Mid tibia inf.	Pro.	3	3	29	29	0	0	3	3
	Retro.	3	3	29	29	0	0	3	3
Mid tarsus	Pro.	0	0	29	29	0	0	0	0
	Retro.	0	0	29	29	0	0	0	0
Hind femur inf. ♂	Pro.	69.1	75.5	10	9	12.0	15.3	50-90	59-100
	Retro.	87.5	91.2	10	9	7.6	12.7	72-102	69-112
Hind femur inf. ♀	Pro.	5.6	5.0	19	17	6.9	4.1	2-28	4-21
	Retro.	2.9	3.3	19	17	4.0	5.4	0-18	0-22
Hind tibia sup.	Pro.	36.2	36.9	29	26	5.0	5.2	27-44	27-46
	Retro.	43	43	29	26	4.1	4.3	32-50	33-51
Hind tarsus 1 sup.	Pro.	1.5	1.4	29	26	1	0.6	0-4	1-3
	Retro.	1.5	1.3	29	26	0.9	0.8	0-3	0-3
Hind tarsus 2 sup.	Pro.	1	1.1	29	26	0.5	0.4	0-2	0-2
	Retro.	1.1	1.1	29	26	0.4	0.4	0-2	0-2

(Figures in parentheses represent number of specimens.)

male (Table 2). Apical spines constant in number, as in generic description. Ratio of length of legs to length of body: Fore leg, male 2.4:1; female 2.2:1. Middle leg, male 2.2:1; female 2.1:1. Hind leg, male 4.2:1; female 4:1.

Genitalia.

Female: Suranal plate, Fig. B, 1 (SAP), distal margin slightly emarginate and clothed with two groups of setae; rest of plate sparsely clothed with setae. Subgenital plate, Fig. B, 2 (SGP), trilobed, all lobes acute at apices which are approximately level distally; whole plate glabrous.

Male: Suranal plate, Fig. B, 3, 5 (SPL), almost completely concealed by tergite VIII and subgenital plate; distal margin emarginate and clothed with short setae; greater portion of plate thickly clothed with setae. Subgenital plate, Fig. B, 3, 4 (H), triangulate, convex proximally changing to concave proximo-medianly and convex distally, distal margin rounded. Proximally plate bears two tubercles; it is keeled medianly; disto-laterally dorsal and ventral surfaces thickly clothed with short setae; rest of plate sparsely clothed with setae. Two styli, Fig. B, 4 (S), very slender, thickly clothed with short setae, length of styli being 0.4 length of sternite IX (S IX). Parameres, Fig. B, 5 (P), elongate, rounded at apex, 2.4 longer than wide, prolateral margin thickly clothed with setae. Pseudosternite, Fig. B, 5 (PD), 1.3 longer than wide, distal portion spatulate-shaped. Penis, Fig. B, 5 (PN), two-lobed, each lobe 1.4 longer than wide. Paraprocts absent.

Locality. S6, Barnett's Cave, Carrai, west of Kempsey, N.S.W. (type locality), coll. P. F. Aitken 1962, C. Carter 1964; S5, Carrai Bat Cave, Carrai, coll. P. F. Aitken 1962, C. Carter 1964; S1, River Cave, Windy Gap, west of Kempsey, N.S.W., coll. R. Shepherd 1964; S2, Col's Cave, Windy Gap, coll. R. Shepherd 1964; Lot's Mansion Cave on Carrai-Kempsey road, coll. P. D. Dwyer 1961.

Types. Holotype male, Allotype female and Paratype male and female, in South Australian Museum Collection, Adelaide. Two Paratypes, one male and one female, in Australian National Insect Collection, C.S.I.R.O., Canberra. Two Paratypes, one male and one female, in the Australian Museum Collection, Sydney.

Australotettix carraiensis differs from *A. montanus* in: 1. Shape of subgenital plate of female; 2. Suranal plate of female less deeply emarginate; 3. Teeth on ventral valves of ovipositor scalloped, not serrated; 4. Subgenital plate of male with rounded apex, and not so strongly keeled; 5. In male, greater development of two lobes from tergites VI, VII and VIII. In female, development of two lobes from tergite VII, and greater development of lobes from tergite VIII.

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Index to Tables.

Arith. Mean, Arithmetic Mean; *Inf.*, Inferior; *L.*, Left leg; *Mid.*, Middle; *Pro.*, Prolateral; *R.*, Right leg; *Retro.*, Retrolateral; *Sup.*, Superior; *Std. Dev.*, Standard Deviation.

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B, basivalvula; BC, basal segment of cercus; C, cercus; DE, ductus ejaculatorius; DV, dorsal valve; E, endapophysis; EP, endoparamere; FCA, feebly chitinized arch connecting rami; H, subgenital plate, male; IA, intersegmental apodeme; MT IX, membrane of tergite IX; P, paramere (ectoparamere); PVII, PVIII, PIX, pleurite VII, VIII, IX; PD, pseudosternite; PN, penis; S, stylus; SVII, SVIII, SIX, sternite VII, VIII, IX; SAP, suranal plate, female; SGP, subgenital plate, female; SGL, suranal plate, male; TVII, TVIII, TIX, TX, tergite VII, VIII, IX, X; 1VF, first valvifer; 2VF, second valvifer.